Appl. No. 09/865,238
Amdt. dated June 22, 2005
Reply to Office action of March 29, 2005

AMENDMENTS TO THE SPECIFICATION

In the specification, please amend paragraphs [0030] and [0032] to read as follows:

[0030] Fig. 3 shows a portion of an OFDM receiver in which the FFT module 34 and the scaling mask 36 are ~~respectively~~ replaced by ~~a set of matched band filters 302 and~~ an optimal multi-carrier detector 304. The multi-carrier detector identifies the most likely vector of transmitted data values given the output vector from the ~~filters 302.~~ S/P unit 32. This is done by an exhaustive search over all possible vectors of data values in each symbol interval to determine the most likely one. The detector 304 preferably chooses the data vector (d_0, d_1, …, d_{K-1}) that maximizes the likelihood function:

$$\underset{d_0, d_1, \ldots d_{K-1}}{\arg\max}\left\{\exp\left(\frac{-1}{2\sigma^2}\int_0^T [r(t)-\tilde{y}(t)]^2\,dt\right)\right\}$$

where $\tilde{y}(t)$ is the modeled output of the channel for a given data vector, $r(t)$ is the received signal, T is the symbol period, and σ is the channel noise power.

[0032] The ~~matched bandpass filters 304 (i.e. a bank of filters having impulse responses $g_i^*(t)$ and $h_i^*(t)$) take~~ detector 304 takes the received signal ~~$r(t)$ and determine~~ and determines a vector of matched bandpass filter outputs ($r_{g,0}$, $r_{g,M}$, $r_{g,1}$, … $r_{g,M-1}$, $r_{h,1}$, …, $r_{h,M-1}$), i.e. the outputs of a bank of filters having impulse responses $g_i^*(t)$ and $h_i^*(t)$, and having $r(t)$ as an input. The detector 304 then determines that the most likely data value vector (c_0, c_M, a_1, …, a_{M-1}, b_1, …, b_{M-1}) is the one that minimizes:

$$\begin{aligned}&4\left[A_0 c_0 \underline{a}^T \mathbf{A}\left(\underline{\mathbf{GG}_0}\right) - A_0 c_0 \underline{b}^T \mathbf{A}\left(\underline{\mathbf{GH}_0}\right) + A_M c_M \underline{a}^T \mathbf{A}\left(\underline{\mathbf{GG}_M}\right) - A_M c_M \underline{b}^T \mathbf{A}\left(\underline{\mathbf{GH}_M}\right)\right] \\ &+ 4\left[\underline{a}^T \mathbf{A}(\mathbf{GG})\mathbf{A}\underline{a} - \underline{a}^T \mathbf{A}(\mathbf{GH})\mathbf{A}\underline{b} - \underline{b}^T \mathbf{A}(\mathbf{HG})\mathbf{A}\underline{a} + \underline{b}^T \mathbf{A}(\mathbf{HH})\mathbf{A}\underline{b}\right] \\ &+ 2A_0 A_M c_0 c_M \mathbf{GG}_{0M} - 2\left[A_0 c_0 r_{g_0} + A_M c_M r_{g_0}\right] - 4\left[\underline{a}^T \mathbf{A}\underline{r_g} - \underline{b}^T \mathbf{A}\underline{r_h}\right]\end{aligned}$$

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where, $\underline{a}$ is the column vector $(a_1, \ldots, a_{M-1})^T$, $\underline{b}$ is the column vector $(b_1, \ldots, b_{M-1})^T$, **A** is a diagonal matrix of scaling factors diag$(A_1, \ldots, A_{M-1})$, **GG**=$[\tilde{g}_i(t)\tilde{g}_j(t)]$ is a correlation matrix between received in-phase carriers $\tilde{g}_i(t)$, $i = 1, \ldots, M$-1, **GH**=**HG**^{T}=$[\tilde{g}_i(t)\tilde{h}_j(t)]$ is a correlation matrix between received in-phase carriers and the received quadrature phase carriers $\tilde{h}_j(t)$, $j = 1, \ldots, M$-1, and **HH**=$[\tilde{h}_i(t)\tilde{h}_j(t)]$ is a correlation matrix between the received quadrature phase carriers. The column vector <u>**(GG$_0$)**</u> is defined by correlation values $[\tilde{g}_i(t)\tilde{g}_0(t)]$, $i = 1, \ldots, M$-1, the column vector <u>**(GH$_0$)**</u> is defined by correlation values $[\tilde{g}_i(t)\tilde{h}_0(t)]$, $i = 1, \ldots, M$-1, the column vector <u>**(GG$_M$)**</u> is defined by correlation values $[\tilde{g}_i(t)\tilde{g}_M(t)]$, $i = 1, \ldots, M$-1, and the column vector <u>**(GH$_M$)**</u> is defined by correlation values $[\tilde{g}_i(t)\tilde{h}_M(t)]$, $i = 1, \ldots, M$-1. The quantity **GG$_{0M}$** is defined to be the correlation value $\tilde{g}_0(t)\tilde{g}_M(t)$. The derivation of this equation is provided in Appendix A.